

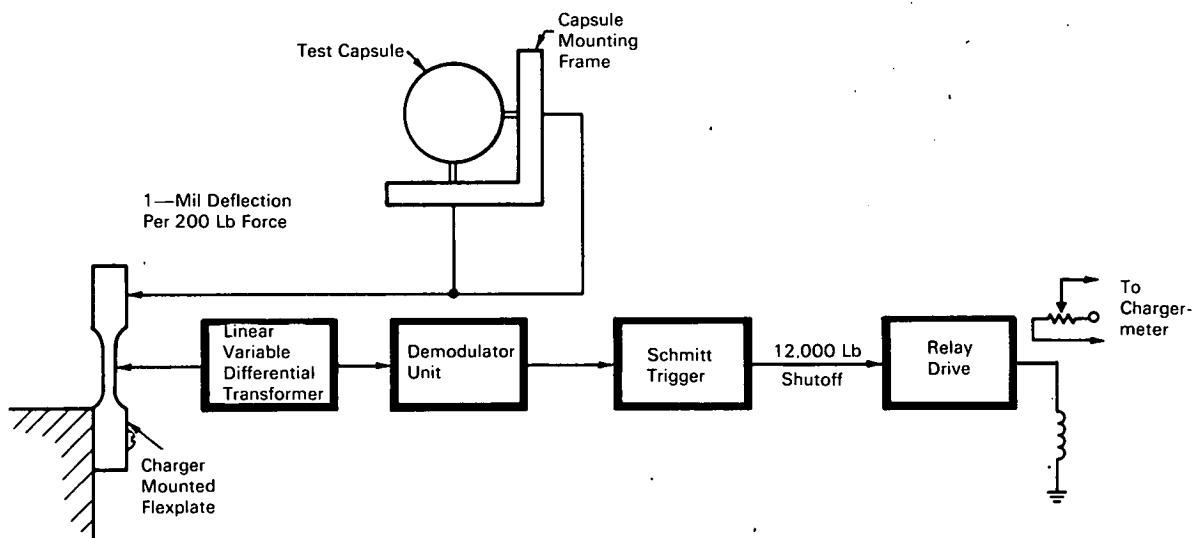


# AEC-NASA TECH BRIEF



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## Deflection Circuit Monitors Force on Object under Water



### The problem:

In nuclear component radiation testing, a capsule containing samples for radiation must be guided under water through a seal to an exact position within the reactor. When the capsule is under water, it is out of sight and, consequently, any guidance error resulting in binding of the capsule in the seal, or contact with any body must be detected before the thin walled capsule is damaged. Therefore it is necessary to monitor the force on the capsule as it is being positioned within the reactor and provide an alarm or stop the positioning system if the forces increase above a predetermined amount.

### The solution:

A linear variable differential transformer (LVDT) flexplate deflection circuit that monitors the force on the capsule as it is positioned within the reactor.

### How it's done:

The capsule containing the samples is mounted on a frame which deflects when the capsule contacts any object or unusual force while it is being positioned. The force on the capsule is relayed to a flexplate mounted on the capsule positioning device. A force of 200 lb on the capsule produces a deflection of 1 mil on the flexplate. A linear variable differential transformer, with its associated demodulator, detects the flexplate deflection and puts out a signal proportional to it. A variable-voltage Schmitt trigger unit is set to trip when the deflection is at the maximum desired level.

The Schmitt trigger unit is set for a 12,000-pound shutoff. Thus, whenever the capsule encounters any deflecting force during positioning that is equal to 12,000 pounds, the Schmitt trigger activates a relay

(continued overleaf)

drive that is connected to the capsule charger motor. The relay shuts off the charger motor until the cause of the deflecting force can be determined.

Use of this deflection circuit prevents damage to reactor parts or to the capsule and its contents while the capsule is being inserted through the seal near the reactor for testing.

**Notes:**

1. This technique is not limited to underwater use, and possible areas of application include off-shore oil rigs, mining, and heavy industry.
2. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer  
AEC-NASA Space Nuclear  
Propulsion Office  
U.S. Atomic Energy Commission  
Washington, D.C. 20545  
Reference: B68-10147

**Patent status:**

No patent action is contemplated by AEC or NASA.

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